ORGANIC SEDIMENT REMOVAL SYSTEMS, LLC

Restoring Ponds and Lakes Throughout the USA

Information Packet

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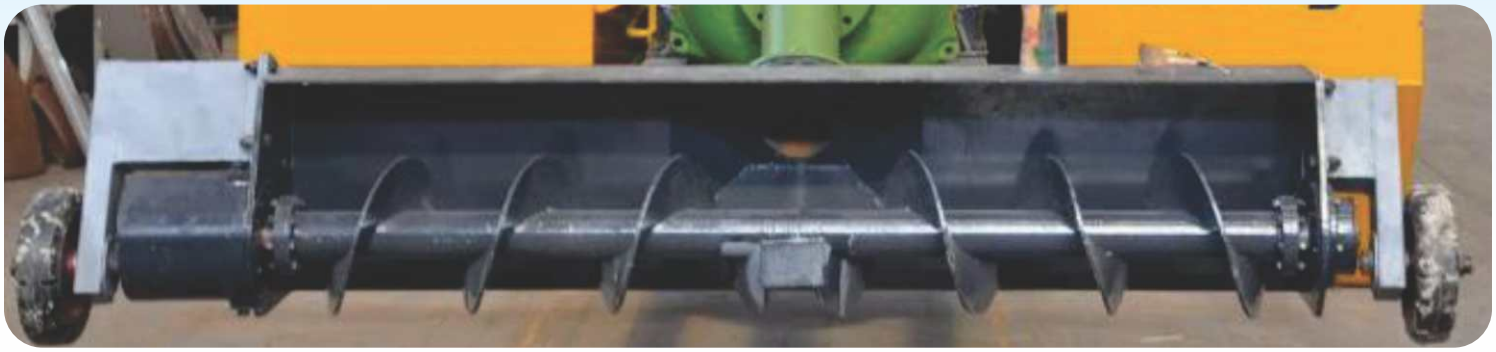
Our Patented Pond Service, Tried and Proven for over 35 Years

How Organic Sediment Removal Systems Works

OSR Systems uses a hydraulic (suction) method of pumping the bottom sediments (MUCK) from any areas of lakes and ponds. This is an extremely clean, powerful and cost-effective way of removing the organic bio-mass, loam soils, clays and other sediments filling in the bottom of lakes and ponds without the use of heavy equipment. Furthermore, our system is environmentally friendly and does not interfere with or harm the existing wild and aquatic life which presently inhabits lakes and ponds.

High-volume suction pumps are used with our patented suction heads guided by divers to remove the bottom sediments instantly by direct contact. This is extremely important. Direct contact removes the sediments without dispersing sediments into the water column, as augers and cutter heads do. Augers need to slide or agitate the material four feet or more into a small center-fix intake location on the barge. This agitation is what disperses fine sediment particles into the water column. Our direct contact forces sediments into the suction head instantly to avoid this disbursement.



This auger has no idea what it is removing, soils, clay and rubber liners. It must slide all the sediments from left to right into the small center opening. Can't find springs that need to be opened. Can't taper the bottom banks. Disperses so much sediment into the water column, most agencies require a turbidity fence around the entire machine.

These divers know exactly what they are removing. Only the sediments that need to be removed, saving time and cost, without damage to clay and rubber lined ponds. They can feel cold water and free up covered springs. They can taper the bottom of the banks. They do not require a turbidity fence. They can target specific areas and fit into very small spaces. When the divers are finished, they leave behind clean water and footprints, not any damage to fine landscaped areas.

Using divers has a tremendous advantage, due to their ability to locate only the sediments needed to be removed, type of sediments, and can target certain sediment areas and depths. They can easily follow the contour of the bottom and deeper channels of lakes and ponds. This also allows the divers to find deeper crevices, freeing up covered springs, taper the bottom banks and avoid disruption to aquatic life. Divers can not only distinguish the different sediments to be removed saving time and cost they do not damage clay or rubber lined ponds. Divers can also target specific areas, fit into culverts, cisterns, wet wells, such as pump stations, irrigation systems, and remove sediments from clogged intake screens, making this system extremely efficient.

Put an inch of chocolate in a glass of milk. Now try removing the chocolate with a spoon. The agitation of the spoon, stirring some of the chocolate into the milk column is how excavators, draglines, augers and cutter heads work. Now, try our system. Place a straw in the bottom of the chocolate and suck out the chocolate. The chocolate is removed with no mess, the bottom is restored, and you have a clean glass of milk.

Once the bottom sediments are removed, the pond is returned to its original bottom. This greatly enhances the water clarity and quality, deepening the pond leaving more water volume and higher oxygen levels, giving your pond a fresh new start as it was in the very beginning.

Let's compare the other solution with our solution and you decide which is the better approach.

Some Other Solutions – Mechanical Dredging

Mechanical dredging is most effective when the pond has been completely drained, and the bottom sediments have had time to dry. This means all aquatic life must either be relocated or killed off. Pumps must be maintained to keep the pond dry and hope it doesn't rain.

If the pond is dredged wet, as soon as the dredge hits the bottom sediments, the very fine particles explode into the water column by the action of the excavator bucket. This saturates the water column with sediments, killing off most of the existing aquatic life and leaves the pond a black, mucky mess. Once the dredging is finished, the suspended sediments then settle back to the bottom of the pond, especially the organic bio-mass, and much of the dredging benefits are lost.

Heavy Equipment Problems:

- **Aquatic life is killed off or relocated**
- **Pond must be completely dry for efficiency**
- **Excavating wet loses most of the benefits**
- **Extensive damage to the surrounding landscape**
- **Equipment hindered by houses, power lines, telephone poles, and mature trees**
- **The cost in many cases is so expensive and most mechanical dredgers will not even consider smaller projects**

The Results Are Crystal Clear

- **The restoration of the natural bottom without disturbing existing aquatic life**
- **A dramatic reduction of sediments, nutrients, weeds, and algae**
- **An expanded living space for aquatic life and a richer environment**
- **No damage to lined ponds, plastic, rubber or clay**
- **Target specific areas, deep areas, and only organic bio-mass saving time**
- **Cleaner water and a healthier ecosystem, increasing property values**
- **Higher oxygen levels and no harmful gases from anerobic bacteria**
- **A great reduction in chemical usage**
- **A cost of up to 50% less than mechanical dredging without damage to existing landscape**

Before

After

Imagine removing the bottom sediments and aquatic vegetation from this lined pond.
This was simply done with our system without any damage to aquatic life, (fish, turtles and frogs)
or replacement of the liner, and no damage to the pristine landscape areas.

Before

After

Discharge Sites: Where the bottom sediments are removed (pumped) to

Open Discharge

Due to the high volume of sediments removed per day, we will require a discharge area on site to discharge the sediments to, such as a large wooded area or fields that flow away from the pond and have depressions the sediments can settle in. The sediments will not mound up, but flow and seek its own gravitational level. Because open discharge areas like this are hard to find, silt containers are used to capture the sediments. Silt containers are polypropylene material woven with a 50-micron sieve. This filter allows the sediments to remain in the silt container while allowing the carriage water to escape on the property. This allows a much smaller size area or footprint for the discharge site. A one-acre pond area, containing one foot of bottom sediments, can be placed in a 30 foot wide x 100 foot long silt container.

After the sediments dewater and hard dry, they can be hauled off site or spread out on the surrounding area and seeded over to avoid hauling charges. Most sediments are good soils and will not harm grasslands or wooded areas. The pump used can reach 200 feet out into a pond or be placed on a barge to target areas further out. We can discharge back up to 2,000 feet, and further with the use of booster pumps. For those who do not have an adequate discharge area, there are other alternative ways to contain the sediments and haul off site. We are having remarkable success in removing bottom sediments in lakes and ponds in this manner and are confident we can be of valuable service for your project.

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Applying For Permits

OSR Systems travels extensively throughout the United States. It is difficult to remain updated on the permitting process. Permits can either be a simple process or rather time-consuming, depending upon your situation.

You should find your local agencies that deal with water and wetland-related permits for your area, such as the Department of Natural Resources, Storm Water Management or local county, city or village. Your specific situation or project will be familiar to your local agency. Once you have made initial contact with your local water management agency, if they have any questions that you cannot answer, we will be eager to assist you.

Rules and regulations change often. Permits now may have two parts to them. The first part will be the acceptance of the methodology or system used for removal of the sediments. The second part will be the acceptance of the discharge site. Make sure you have both the sediment removal and the discharge site approved by the agency with the authority governing these issues.

You will need to explain our process and methodology. Please use the enclosed literature titled "Applying for Permits" on the following page.

Applying For Permits

When inquiring about permits, start with your local water management agencies, village, or county.

When agencies hear about dredging a waterway, they immediately think of draglines, graders, barges, cutter heads, augers, and the like. These methods can be very destructive, causing alarm to the environment and naturally raising concerns. OSR Systems uses none of the equipment above, but unfortunately, because we accomplish the same results, we are sometimes classified into all the above. OSR Systems uses our own technology and patented system, which effectively removes bottom sediments with very little disruption of the body of water and environment. Our system will not change the original engineered design of the watershed, natural contours, and shoreline area, nor will it require draining the pond, thus leaving the aquatic wildlife undisturbed.

Our system only removes foreign material which has been deposited in the body of water. These deposits are shallowing the body of water, changing the design, intended function, and causing adverse effects to the environment.

The methodology of our operation is important. A centrifugal, water pump is used to create suction through an intake hose placed in the bottom of the pond. Scuba divers, using a non-aggressive suction head (scupper intake), guide the suction head through the bottom sediments.

Using divers is our greatest advantage, due to their ability to locate only the sediments to be removed, type of sediments, and can target certain sediment areas and depths. This also allows the divers to find deeper crevices, free up springs, taper the bottom banks and avoid disruption to aquatic life.

Best analogy: Pour an inch of chocolate into a glass of milk. Then, try to remove the chocolate with a spoon. (The agitation of the spoon mixing chocolate into the milk is similar to cutter heads and augers.) Now try our system. Place a straw into the bottom of the glass and suck out all the chocolate from the bottom. You will be left with a glass intact and a clean glass of milk with no disruption. This is a powerful, but passive way to remove bottom sediments without disruption to the design, engineering, aquatic life, or natural habitat.

Because of these unique features, we only remove foreign deposits and bring the body of water back into specifications. We are hoping OSR Systems would rather be classified as a maintenance system.

As for the discharge and sediments being removed, they pass through the water pump and via a discharge hose, are pumped into a Geotextile tube, woven with a 50-micron filter sieve, (GT 46 or equivalent). These dewatering tubes are approved and standard throughout the industry.

Listed below are examples of pond-restoration projects performed by OSR Systems which have proven to have no damaging impact on the environment.

Example 1

Sediment Removal for Harbors and Channels
Washington Island - Door County, Wisconsin

OSR Systems was the only system approved by the Department of Natural Resources to remove sediment in this area because of its low disturbance to the environment.

Example 2

Sediment Removal for Retention Ponds
Underwriter's Laboratories - Northbrook, Illinois

Contractors using augers needed to lower the 25-foot deep, 3-acre pond to a 5-foot water depth to function. This would have a considerably negative impact on the aquatic life throughout the pond. OSR Systems can operate to a depth of 90 feet. Therefore, there was no need to lower the water depth.

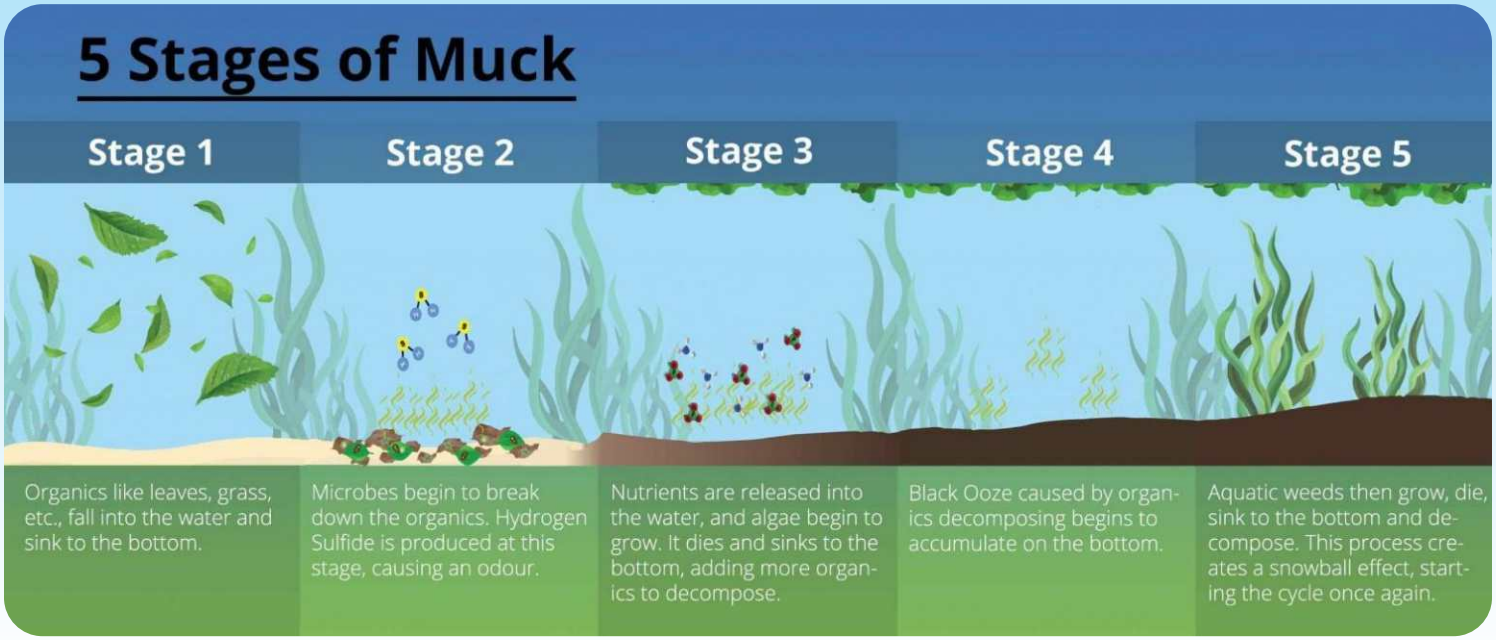
Example 3

Sediment Removal for Ponds in Public Areas
Turner Pond - Roselle, Illinois

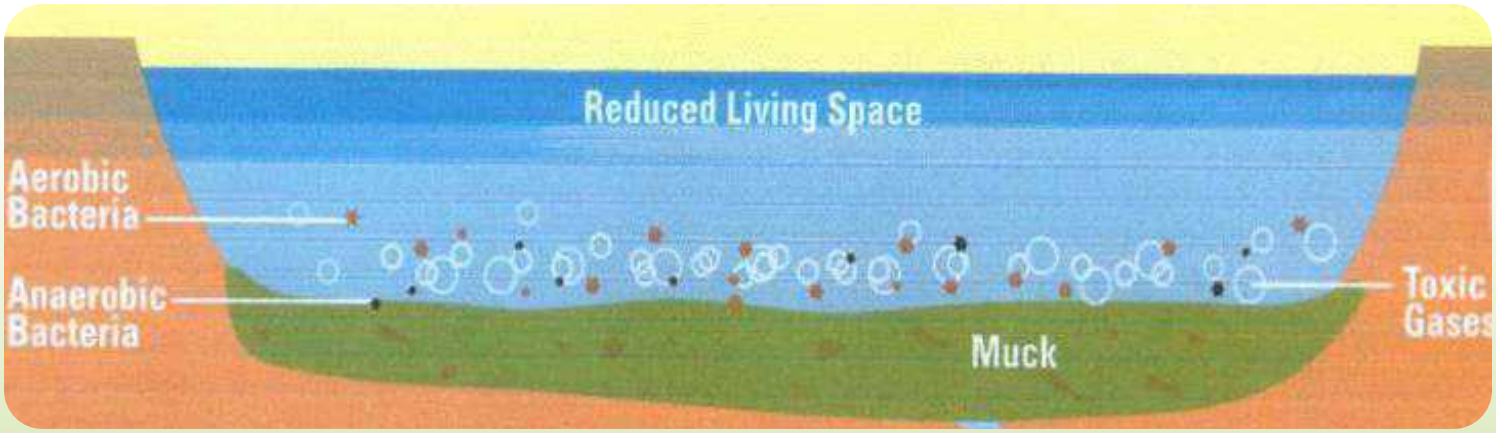
This 2.5 acre pond is centrally located in Roselle, Illinois. It is richly landscaped with playgrounds, picnic areas, and jogging paths which attract high traffic. Their major concerns were impairment to fishing and aquatic life, reduction of park-facility use, and destruction of the landscape. OSR Systems allowed all the park's activities to continue without interruption. The only visible impact to the landscape of the 20-acre park was a discharge area located on site, which used an area totaling 150 X 50 feet adjacent to Roselle Avenue.

The Health of your Pond Relies on You!

Lifecycle of a pond



Unfortunately, for all ponds at the moment of creation, they start a decaying process. This is nothing to be alarmed about. It is just part of a natural cycle of nature trying to reclaim, or "fill in a hole in the ground we call a pond", or any body of water, transforming them into a swamp, to a marsh, to a bog, and finally a prairie. Unless we intercede.



In the shallows, up to about three to five feet of highly oxygenated water (epilimnion), live the aerobic bacteria, breaking down nutrients, supporting phytoplankton which feeds the zooplankton, feeding the minnows and larger fish. This bacteria decomposes foreign matter quickly and is the foundation of nutrients for the animal and plant kingdom. In the deeper areas live the anaerobic bacteria (metalimnion and hypolimnion), which cannot decompose the incoming matter quickly enough. This causes sediments to fill in the pond and cycle from the oligotrophic state to a middle-aged, mesotrophic stage, than eutrophic state and finally to an older hypertrophic stage. The byproducts of anaerobic bacteria are methane, hydrogen sulfide, gaseous nitrogen, sulfur dioxides, phosphates, and nitrogen, diffusing throughout the water column in the pond, reducing oxygenated water levels for fish and other aquatic species.

The MUCK accumulating at the bottom of this pond is nutrient-rich and creates a vicious, deteriorating cycle. In essence, instead of the aerobic bacteria feeding the animal kingdom and continuing a natural, healthy food chain, the anaerobic bacteria disrupts this natural process and feeds the plant kingdom, increasing algae and weed growth, thus suffocating the pond. Natural springs and aerators help, but eventually even they lose ground to this natural process, as the pond continues to a hypertrophic state. The above picture is a perfect example of the hypertrophic state.

Types of Sediment and Sediment Compaction

All ponds seem to basically be the same, but they are not. Different factors affecting ponds can be:

- Ponds in heavily wooded areas will accumulate many more leaves and have a higher PH-level, (or alkaline) than those ponds that are surrounded by pines, which have a lower PH level, (or acidic).
- Larger ponds will have huge geese and duck populations, where smaller ponds will have few, if any at all.
- Spring-fed, icy-cold ponds will retain cool temperatures, whereas shallow, warmer ponds which heat up quickly will accelerate algae growth and decrease oxygen levels.
- Feeder streams and culverts can deposit much more foreign material into a pond than a closed system.
- Neglected ponds produce heavy amounts of weeds and algae which creates sediment quickly.

As you can see, the list can go on and, in each situation, can substantially affect the sediment composition and ecology of a pond. Because of these factors, the depth of sediment, consistency, and viscosity can change dramatically.

In most ponds, the sediment is layered. The bottom layer, depending on the ground the pond was dug in, averages around six inches of soft and clumpy clays. This material is usually left behind by the excavators of ponds and caused by water permeation.

Next is a layer of fine clays and soils, mixed with few organics, which has the viscosity of a fine cream. These layers usually occur when the pond first fills with water and the sides become soluble and slowly flow to the bottom. The third layer is typically 50% organic biomass and 50% of loam soils. The fourth layer is 80% organics 20% soils. This material generally accumulates on an average of one-half inch per year in normal conditions.

Engineers who study this material and build the sediment containers dehydrate the organic material in their laboratories. After all the water evaporates and the material compresses to a solid state, it is then studied and re-measured. It is interesting to note that the ratio from liquid to solid has a 12:1 compression ratio in organic bio-mass sediments. In other words, 12 inches of liquid organic biomass, suspended in the water column, after compression and dehydration, amounts to one inch of the same material, settled and hard dried in the field or sediment containers. Different material dewaters and compacts differently. When clay and loam soils are mixed in with the organics, we see anywhere from a 5:1 to 8:1 compression ratio. This is because clays and soils are materials with a more solid substance with little compression. Sand, being solid particles, has no compression ratio.

Frequently Asked Questions

Here are some answers to the most frequently asked questions. Hope this helps!

Do you service my area?

We service projects throughout the United States, Canada and Mexico.

What size ponds can you clean?

From small backyard ponds to 10 acres, but we can also target specific areas of lakes, lake fronts, harbors, channels and hard-to-reach areas such as pump stations and irrigation systems.

How often does this have to be done?

We see an accumulation of ½ inch to 1 inch of sediment per year depending on the maintenance and forestry around the pond. Our own personal ponds, which are ¾ acre in size, 15 feet deep, and in a heavily wooded area, were cleaned 23 years ago. Initially, we were spending an unreasonable amount of money on chemicals, flocculants, aeration equipment, bacteria, etc. in order to control weeds, algae, and remove bottom sediments, with limited results. Once we developed this system and removed the bottom sediments of our pond, we spend no more than $175 annually on maintenance. So, depending on how well you maintain your pond, after removing the bottom sediments, it should last 20-25 years.

How does your system work?

The system hydraulically removes the decaying sediment from the bottom of lakes and ponds. Any area could be specifically targeted and is incredibly cost-efficient and environmentally friendly.

Will this adversely affect aquatic life and fish?

No. Our system does not harm aquatic wildlife (fish, turtles, frogs, etc.). You do not have to relocate any aquatic wildlife.

What do you do with all the sludge that you pump out?

Some people have enough property to discharge on site. If not, we provide other alternatives. We can use silt containers which compress and filter the sediments, or utilize our newly developed shoreline restoration and erosion control with the same sediments.

Will this destroy any of my property?

So far, after 35 years, we have not had any damage to fields, farms, or wooded areas we have pumped to. Because of its liquid form, gravity will disperse it evenly among the grasses and fields. In addition, it is so nutrient-rich that the plants love it and so do the farmers, if fields are available.

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Frequently Asked Questions

How far can you pump the sediment?

1,000 feet. Booster pumps can be used to pump further distances.

Do you come out and inspect the ponds and give estimates?

We charge by time and material and have a good idea what the cost will be by the size and age of the pond. But for a more accurate proposal, we will perform a sediment depth study. With our experience, if we know the size, depth, age, and surrounding foliage. We are usually very accurate of how much time it will take to clean a specific pond or area. The only other concern is the discharge site and 99% of the time we can solve that over the phone. But for a more accurate proposal, we will perform a sediment depth study, for the amount and viscosity of the sediments.

Do you have to clean the entire pond?

No, we are mainly concerned with the deeper bowl area, where the bulk of the sediment has accumulated and is doing the most environmental damage. Targeting just this area has proven to work wonders for the pond. But, 90% of the time we remove most all the sediments from the pond.

How much sediment can you remove?

In one pond, we removed 14 feet of organic sediment **before** we reached the original bottom. Most ponds, however, have an average of 1-3 feet of sediment.

How much does this cost?

This would depend on the liquid cubic yards of accumulation in the pond. We use satellite imagery for all projects to get the size of the pond. With the age of the pond, along with the experience we have, we can give a fairly close estimate.

Why do ponds have to be cleaned?

Mother Nature tries to reclaim all bodies of water. This is a natural process which fills the pond with sediments. Every year more material is added until the pond becomes a bog.

What about aeration systems?

About 90% of the ponds that we clean have aeration systems, (mine included). After following instructions and $5,800 a year later, I dove to the bottom of my pond and shoved my hand up to my shoulder in solid muck, which was not supposed to be there if aeration systems and all the bacteria we put in were that effective. That's when I developed our system. I think aeration systems are a big plus to alleviate some of the gases mentioned above from saturating into the water. But, as for decomposing sludge from the bottom, my personal experience and others' have had little success. After we clean a pond, I think aeration systems are a great help in keeping a pond cleaner and healthier longer.

Frequently Asked Questions

What is the difference between your system and mechanical excavators?

Water is a disadvantage to heavy equipment. A reputable excavator will drain the pond first to ensure that the sediment solidifies to a more manageable and solid form. Otherwise, the sediment will just slop around the blade. That is why they are very pricey. To dragline wet, remember the sediment is in a soft, suspended liquid state. When the bucket hits the sediment, the sediment explodes in the water, saturating the entire water column, (like a spoon stirring chocolate in milk.) Yes, you will have a deeper pond, because they can remove the hard clays and soils beyond the original at the bottom when they dig. But, when they are finished and the suspended sediments in the water column settles, you are right back where you started. Along with hefty re-landscaping cost.

What are the benefits of Shoreline Restoration and Erosion Control?

We have developed a system that uses the removed sediments from the bottom of the pond and places them back on the eroded shoreline. The benefits are your pond is cleaned and shoreline is restored all in one process. You are using your own material. The material is rich in nutrients, allowing plants and sod to establish quickly. It is long lasting, has high water retention, low maintenance, rodent proof, and low cost.

What happens after my pond is cleaned?

After we clean the ponds, we advise you how to take care of it afterwards, so you can enjoy a healthy and fruitful pond for years to come.

How can I keep my pond clean longer?

It is best to clear hanging limbs and overhanging trees from around the pond. Willow trees can add up to 4 inches of sediment to a pond each year. Brush and tall grass acts like a fence and keep leaves and other debris from entering the pond. Rake leaves and grass clippings as soon as possible to prevent them from blowing into the pond. Implement an algae and weed preventive maintenance program.

We hope we have answered your questions. If you have any further questions, please contact us.

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Founder's Message

Richard Kohutko
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Dear Pond Owner:

I would like to introduce you to Organic Sediment Removal Systems and give you a little history. I am the owner and founder of OSR Systems. In 1990, I developed a system that removes foreign sediment deposits (commonly referred to as MUCK)

from the bottom of lakes, ponds and other bodies of water, restoring them to their original depth and natural beauty.

As a Rescue Diver with the Juneau County Sheriff's Department Dive Team and owner of two ponds, I became very concerned after spending large amounts of money on my own ponds on chemicals, aeration systems, etc. yet, the ponds continued to deteriorate.

After further study of ponds and other water ways, I discovered that the bottom had accumulated 1 ½ to 2 feet of MUCK; a substance sealing off the entire bottom, clogging springs, and stopping any ground flow of fresh water into the pond, leaving it stagnant and deteriorating. Furthermore, this MUCK; comprised mostly of organic matter, was being decomposed by anaerobic bacteria, a very slow process. So slow, it could not keep up with the annual accumulation of debris. The anaerobic bacteria and organically-rich MUCK was actually feeding the plant kingdom, compounding the problem with more weed and algae growth. It also reduced the clean oxygenated water by saturating the water column with nitrogen, phosphates, sulfur dioxide, and methane gases to start. Typically, this is Mother Nature's way of filling in ponds and transforming them into swamps, marshes, and prairies.

After realizing the problem and after some experimentation, I developed a very unique system unlike any other to efficiently remove the MUCK from the bottom of ponds, restoring them to their original condition with great success. OSR Systems has been restoring ponds and other waterways for thirty-six years throughout the USA. Unfortunately, it is practically impossible to visit every project. Even then, a diver would have to take sediment samples to determine the viscosity, type, and amount of sediment depth in each pond. Because we have over three decades of experience in sediment removal, just by knowing the size, a few facts and age of a pond, we can make a fairly accurate determination of cost.

Removing the organic sediment (MUCK), and other deposits from the bottom of ponds is the first and most important step in restoring any body of water to Its original design. Once this MUCK is removed, you will notice the difference as your pond starts to revive itself back into balance with the animal kingdom, providing microorganisms for fish and other aquatic wildlife which thrive in healthy ponds.

We have performed more than 2,000 projects for private individuals, HOA associations, business clients, governmental agencies, engineering firms, and land and property management companies and regularly serve as consultants to these individuals for water-management control in the area of design, treatment, restoration, and maintenance of ponds and other waterways.

Since its conception, we recently expanded our operation throughout the country. Besides our principal office in Wisconsin, we presently have offices and affiliates in Florida. Our system is unparalleled, as we hold a copyright, trade secrets, and a mechanical equipment patent for our hydraulic dredging which is exclusive to OSR Systems.

Because all projects are different, our knowledge and experience allow for flexibility in completing any project. We accommodate all of our clients to ensure that their time and funds fall within their budgetary concerns. Each project is evaluated individually in order to eliminate waste and time. Our hands-on approach and personal interest in our projects ensure an efficient and successful work ethic. Our integrity is second to none, and we pride ourselves on our 36 years of successful business relations. We have salvaged many ponds for our clients in the past using this system, making ponds and other waterways easier to maintain thereafter. We also have sustained an extensive aquatic network which offers 365-day support to maintain our clients' ecosystem to enjoy for years to come.

Organic Sediment Removal Systems, LLC, complies with all federal, state, and local laws and regulations and adheres to the Department of Transportation's requirements for transporting our system, along with all liability coverage and other insurance requirements.

Because we stay current with the latest technologies and are always broadening our knowledge of the industry, we can assist our clients to make informed decisions on the most effective solution for their project. We can also answer and solve their specific questions and concerns about hydraulic or mechanical dredging, pond design, aeration systems, engineering, biological treatments, or chemical applications.

"Green" products, services, and latest technologies are researched and integrated to compliment our service. We introduced to the industry the "*Swifter Sifter*" which removes organic matter such as newly deposited leaves, sticks, algae, and weeds from the surface and bottom of ponds.

We are a company who has worked in this industry for over 36 years and are involved with some very prestigious organizations, proving to be a company qualified to service your most difficult needs.

"Family Owned & Operated Since 1991"

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